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ORIGINAL PAPER

Poor results after interpositional arthroplasty with fascia lata allograft for arthritis of the trapezio-metacarpal joint

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Abstract Arthrodesis or autologous tendon interposition can relieve pain associated with arthritis of the carpo-metacarpal joint of the first ray (CMC-I), but has its limitations. The aim of this study was to assess whether trapezium resection and fascia lata allograft (Tutoplast) interposition is a good alternative. Thirty-eight such combined CMC-I arthroplasties in 36 patients with a median age of 57 years and a median follow-up of 25 months were analysed for complications; Disabilities of Arm, Shoulder, and Hand questionnaire (DASH) scores; pain; and patient satisfaction. Complications occurred in 13 of the 36 patients (36%). The median DASH score was 25, and pain was reduced in 22 patients (85%). Thirteen of the 36 patients (36%) were not satisfied. Trapezium resection and fascia lata allograft interposition do not seem to be good alternatives for CMC-I arthritis.

Keywords Carpometacarpal joint · Osteoarthritis · Arthroplasty · Allograft

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Introduction

Because the thumb endures half of the workload of the hand, its joints are susceptible to arthritis. The trapezio-metacarpal or carpo-metacarpal joint of the first ray of the hand (CMC-I), in particular, is susceptible, and pain is the presenting symptom of CMC-I arthritis. The diagnosis, then, may easily be confirmed radiographically.

Treatment modalities for arthritis of the CMC-I joint are well established, and consensus exists that the condition should primarily be treated conservatively [25] and that surgical treatment is indicated only in cases where pain is therapy-resistant and restricting the activities of daily living [11]. Still, the choice of surgical treatment of CMC-I arthritis is still subject to debate. The numerous procedures described to date include ligament reconstruction of the CMC-I joint [14], metacarpal osteotomy [37], total joint arthroplasty [2, 6], silicone arthroplasty [32], carpo-metacarpal arthrodesis [5], and trapezium resection with or without ligament reconstruction and soft tissue interposition [3, 16, 17]. So far, none of these techniques has fulfilled all requirements of the perfect surgical treatment that results in a strong, painless, stable, and mobile first ray with long-lasting function. Although CMC-I arthrodesis provides excellent pain relief and high patient satisfaction [19], it implicitly results in reduction in mobility, increase in scapho-trapezial arthritis, risk of non-union, and the possible need to secondarily remove the osteosynthesis material [10]. Although tendon interposition arthroplasty may provide superior pain relief and mobility, it necessitates additional soft tissue dissection and scarring to retrieve the tendon to be interposed [3, 12, 26]. Moreover, such interposition may be hampered by the relatively small amount of tendon material available in the upper extremity [30], and consequently, autologous fascia lata grafts have

been used [4, 29, 36]. However, the fascia lata proved to be unpredictable in quality, and its use is often accompanied by haematoma in the thigh and pain leading to increased hospitalisation [15].

To prevent such donor site morbidity and to ensure a sufficient interposed soft tissue volume to allow thumb mobility, we have used commercially available fascia lata allograft sterilized with ethylene oxide (Tutoplast human fascia lata, Tutogen Medical GmbH, Neunkirchen am Brand, Germany) as interposition material. To date, there have been no reports in the literature on interpositional arthroplasty with such fascia lata allograft as a treatment modality of CMC-I arthritis. Therefore, we set out to evaluate the results of such CMC-I arthroplasty in a multicentre trial.

Materials and methods

Patients

From 1998 through 2003, 8 men and 28 women with a median age of 57 years (range, 28–77 years) underwent combined trapezium resection and fascia lata allograft interposition for the treatment of arthritis of the CMC-I joint in the Academic Medical Center (AMC), the Onze Lieve Vrouwe Gasthuis (OLVG), and the VU Medical Center (VUMC) in Amsterdam, the Netherlands (Table 1). The dominant hand was involved in 16 patients and the non-dominant hand in 18. The 2 remaining patients had both thumbs treated surgically, so in all, 38 arthroplasties were done in 36 patients.

Thirty-two patients were, or had initially been, diagnosed with primary arthritis and four with post-traumatic arthritis. The inclusion criteria for arthroplasty were (1) severe pain located at the base of the thumb that had proven resistant to conservative measures and (2) X-ray changes confirming the presence of CMC-I arthritis. Because no feasibility study on the applicability of fascia lata allografts for this indication had been reported when these patients were included, informed consent was obtained from all before surgery.

Table 1 Characteristics of the 36 patients who underwent a total of 38 trapezium resections combined with fascia lata allograft interpositional arthroplasties for CMC-I arthritis

Characteristic	Number of patients	Number of allografts
Profession		
Labourer	10	10
Housewife	12	13
Desk employee	8	9
Medical profession	6	6

Preoperative staging of arthritis

Radiographs were made preoperatively of the arthritic CMC-I joints of all 36 patients. The stage of CMC-I arthritis according to Eaton and Littler [13] could be determined in 25 patients. Six patients (7 joints) were diagnosed with stage II disease, 13 patients (14 joints) with stage III, and 6 patients (6 joints) with stage IV disease. The radiographs of the CMC-I joint of one more patient insufficiently allowed for proper staging of the arthritis. The remaining 10 patients had previously undergone some sort of surgical treatment of the joint without lasting success and, in these patients, staging was no longer feasible (Table 2).

Surgical technique

According to local routine, the patients treated in the AMC and VUMC were given a single-dose preoperative antibiotic prophylaxis (n=25), whereas this prophylaxis was continued for 24 h in the OLVG (n=11). All patients were operated on in a standardised fashion in accordance with the procedure originally described by Froimson in 1970. Rather than half of the flexor carpi radialis [16], a roll of fascia lata allografts was used as interposition material to replace the trapezium (Fig. 1). This procedure was followed by postoperative immobilisation, using a thumb spica cast for 6 weeks. After that, the patients started active range of motion exercises.

Assessment of objective outcome

The charts of all 36 patients (38 allografts) were retrospectively reviewed to assess the immediate postoperative course and to trace any and all complications as a measure of surgical outcome.

Thirty-three of the 36 patients (34 allografts) were available for follow-up. Seven of these 36 patients (8 allografts) were excluded from functional and subjective analysis because the outcome of their treatment was

Table 2 Previous surgical treatment in the 10 patients who underwent fascia lata allograft interpositional arthroplasty as a salvage procedure

Previous treatment	Number of patients	Number of joints
Arthrodesis	3	3
Eaton and Littler [13] procedure	1	1
Silicone trapezial implant	1	1
Palmaris longus ‘anchovy’	2	2
Flexor carpi radialis interposition	2	2
Distal trapezium excision	1	1

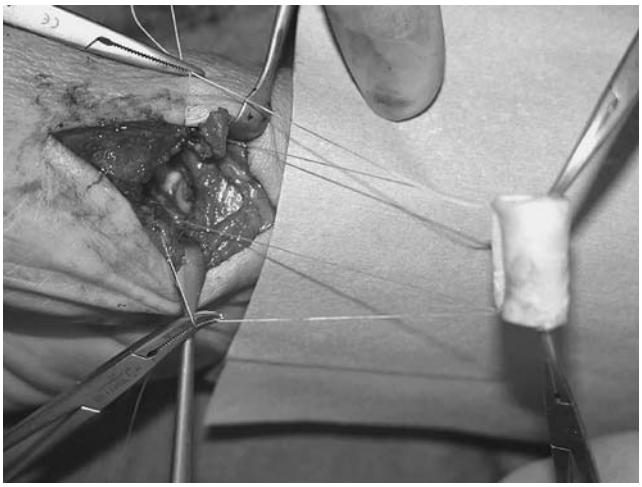

Fig. 1 Intra-operative view of the arthroplasty using an 'anchovy' of fascia lata allograft

considered a failure because of loss of the allograft (5 patients; 6 allografts) or repeated surgery for migration of MC-I (2 patients; 2 allografts). Hence, the outcome was assessed in 26 patients (26 allografts) with a median follow-up of 24 months (range, 2–52 months).

Basic joint motion was evaluated clinically by two simple tests to objectify the functional outcome. Abduction was tested by evaluating the patient's ability to place the palm entirely flat on a table top, and opposition was tested by evaluating the patient's ability to bring the tip of the thumb to the fifth metacarpal head. Each activity was rated on a scale from 1 to 5, with 1 indicating no difficulty and 5 indicating complete inability to perform the task.

Objective assessment of the long-term functional outcome was further assessed by use of the Disabilities of Arm, Shoulder, and Hand questionnaire (DASH) [18, 20]. The DASH mainly consists of a 30-item symptom scale from 0 (no disability) to 100 (maximum disability). Basically, it scores the degree of upper extremity restrictions, dysaesthesia, and pain during the preceding week [18].

Table 3 Postoperative course and complications

Postoperative course	Number of patients	Number of allografts
Uneventful	23	25
Eventful[a]	13	13
Allograft related		
Allograft infection	6	6
Allograft luxation	1	1
Non-allograft related		
Haematoma	2	2
Skin infection	2	2
Reflex dystrophy	4	4
MC-I impingement	2	2

[a] Four patients had two complications.

Assessment of subjective outcome

Subjective evaluation of the results comprised the patient's opinion about the intensity of the pain, current pain in comparison with preoperative pain, cosmetic appearance of the hand, and overall satisfaction with the procedure.

Pain intensity was rated from grade 0 (never) to 4 (constant pain) [1]. Current pain in comparison to preoperative pain was scored as follows: much less, less, same, or worse. Both the satisfaction with the cosmetic appearance of the hand and the overall satisfaction with the procedure were rated as very satisfying, satisfying, dissatisfying, and very dissatisfying.

Results

Procedure-related complications

The postoperative course was uneventful in 23 of the 36 patients (25 out of 38 allografts). In seven patients, the allograft was spontaneously lost or surgically removed because of infection or luxation, whereas complications were not specifically related to the use of the fascia lata allograft in the six remaining patients (Table 3). Reflex sympathetic dystrophy occurred in four patients and was treated successfully with physiotherapy (n=4) and regional intravenous sympathetic blockade (n=2). Two patients suffered from pain due to proximal migration of MC-I, and in both, the pain required repeated surgery (Table 4).

Objective functional outcome

Sixteen of the 26 patients included for functional and subjective analysis (26 allografts) were able to flatten their hand as well as to fully oppose their thumb up to the fifth metacarpal head, whereas in the others, the outcome was less favourable (Table 5).

The median DASH score was 25 out of 100 (range, 0.0–85.0; mean, 29). Most DASH items were scored 2 on a scale ranging from 1 to 5, indicating only mild disability (Table 6). The median score for 'performing difficult domestic activities' was 3, indicating moderate disability.

Table 4 Repeated surgery as performed in five of our patients after fascia lata allograft interpositional arthroplasty

Repeated surgery	Number of patients	Number of allografts
Extirpation of allograft	3	3
Arthrodesis	1	1
Arthroplasty	1	1

Table 5 Outcome of objective functional testing of 26 patients with 26 allografts

Function	Number of patients	Number of allografts
Opposition		
No difficulty	17	17
Mild difficulty	5	5
Moderate difficulty	2	2
Severe difficulty	1	1
Unable	1	1
Abduction		
No difficulty	16	16
Mild difficulty	7	7
Moderate difficulty	0	0
Severe difficulty	1	1
Unable	2	2

Subjective outcome

Seven of the 26 patients (7 allografts) were entirely free of pain, and nine more patients experienced only pain during heavy activities (Table 7). Twenty-two patients (22 allografts) considered the pain to postoperatively be less in comparison with the preoperative situation, or even absent.

Table 6 Results of the DASH score (median per question and median per patient)

Domestic activities	Median	Range
1. Opening a jar lid	3.00	1–5
2. Writing	2.00	1–3
3. Turning a key	2.00	1–4
4. Prepare a meal	2.00	1–5
5. Opening a heavy door	2.00	1–5
6. Placing a object to a high shelf	3.00	1–5
7. Performing difficult domestic activities	3.00	1–5
8. Gardening	3.00	1–5
9. Making your bed	3.00	1–5
10. Carrying a heavy bag	3.00	1–4
11. Carry a heavy object (>5 kg)	3.00	1–5
12. Changing a light bulb	2.00	1–5
13. Washing and drying your hair	2.00	1–4
14. Washing your back	3.00	1–5
15. Putting on a sweater	2.00	1–4
16. Cutting meat with a knife	2.00	1–4
17. Leisure activities with a light load	2.00	1–4
18. Leisure activities with stress put on the arm	3.00	1–5
19. Leisure activities with free arm movements	3.00	1–5
20. Organizing transport	2.00	1–4
21. Sexual activities	1.00	1–5
22. To which extent has the hand problem influenced your social activities with friends, family, and neighbours?	2.00	1–5
23. Were you limited in some way at work or other daily activities because of the hand problem?	2.00	1–4

Median DASH score, 25.0; range, 0.0–85.0

Twenty-five of the 26 patients considered the cosmetic appearance as satisfying or very satisfying.

The overall result was satisfying or very satisfying to 20 of the 26 patients (20 allografts). Still, one patient (1 allograft) considered the overall result to be unsatisfactory because the pain was even worse than before surgery. In this patient, the allograft had been interposed as a salvage procedure after a failed surgical procedure elsewhere.

Discussion

Before we discuss the clinical implications of our observations, some potential shortcomings of our study need to be addressed. First, the analysis of objective and subjective hand function was measured postoperatively only, and therefore, the effect of surgery on this outcome was not measured in this study. Still, the postoperative outcome scores allowed us to compare this technique with the outcome of alternative techniques reported in the literature. Second, rather than goniometrically measuring the CMC-I range of motion, we settled for two simple clinical tests to assess the mobility of the first ray. This was done because these tests are proven easily and reproducible [23], whereas goniometer measurements are notoriously inaccurate when used to assess thumb basic motion [23]. Likewise, rather than assessing the pinch or grip strength, we assessed the

Table 7 Outcome of subjective assessment of 26 patients with 26 allografts

	Number of patients	Number of allografts
Pain		
Never	7	7
During heavy activities	9	9
During light activities	5	5
Spontaneously, sometimes	5	5
Always	0	0
Pain in comparison with preoperative pain		
Much less	13	13
Less	9	9
Same	3	3
Worse	1	1
Cosmetic results		
Very satisfied	21	21
Satisfied	4	4
Dissatisfied	0	0
Very dissatisfied	1	1
Overall satisfaction		
Very satisfied	7	7
Satisfied	13	13
Dissatisfied	5	5
Very dissatisfied	1	1

DASH score because it has been well established that questionnaires can elicit reliable and valid information regarding patient status [18]. Finally, the outcome of this study may be biased by the inclusion of 10 patients who previously had undergone surgery, as this may have resulted in a higher complication rate and a lower functional outcome compared to that of primary surgery only. The median DASH score for the 10 patients who underwent previous surgery in our series was 40.8 compared to 23.3 in the 26 patients who did not previously undergo surgery. Still, such inclusion allowed us to compare our results to those of other authors who also included patients who had undergone previous surgery [33].

The advantages of interposition arthroplasty with fascia lata allograft are the simplicity of the operation, the independence of quantity of autologous material, the lack of donor site morbidity, the lack of need of temporary internal fixation or Kirschner wire fixation, and the possibility to perform surgery through one small incision that provides excellent cosmetic results and little risk of nerve damaging. An obvious disadvantage of this technique, however, proved to be the increased risk of infection because of the use of foreign body material. A deep infection of the allograft resulted in the loss of the allograft in six patients (0.17), and the fraction of repeated surgery because of a deep infection of the allograft in our series was 0.06. Overall, we observed complications in no less than 13 of our 36 patients (0.36). This compares to the 5% to 50% complication rates reported for other techniques to treat CMC-I arthritis [9, 19, 22, 24]. Complications were predominately observed early in our series, and this may indicate that arthroplasty using Tutoplast features a learning curve. Furthermore, because all deep infections were observed in the sub-group of patients who were given only one dose of prophylactic antibiotics, we advocate prolonged antibacterial prophylaxis when using such allografts.

The aim of interposition arthroplasty is primarily to achieve a stable and mobile thumb free of pain. Twenty-two of the 26 patients in whom surgery was uneventful (0.85) could touch the base of the small finger, and this compares with the 67% to 96% reported in other studies [23, 33]. Pain relief after surgery was observed in 22 out of the 26 patients (0.85), which compares with the 67% to 92% reported after tendon interposition arthroplasty [3, 7, 16, 31, 35]. The patients in our series who had previously undergone surgery for CMC-I arthritis, in particular, continued to experience pain and difficulties with daily life activities. More careful patient selection may prevent such disappointments.

Six of the patients in whom surgery was uneventful were dissatisfied with the result of surgery. Added to the 7 failure cases, our rate of dissatisfaction amounted to 13 out of 36 patients (0.36), or 14 out of 38 allografts (0.37). This compares with the 4% to 91% observed in studies on other forms of basal joint arthroplasty [8, 9, 21, 22, 27, 31, 33]. The mean postoperative DASH score we observed (29) was similar to that reported for other techniques (23 to 26) [28, 34, 38]. Still, we were unable to achieve an increase in patient satisfaction and functional improvement compared with other forms of treatment of CMC-I joint arthritis.

In conclusion, we present the first series of combined trapezium resection and fascia lata allograft (Tutoplast) interposition as a treatment modality for CMC-I arthritis. When uneventful, this combination presents a quick and easy procedure that may provide adequate pain relief, favourable functional results, and a good cosmetic outcome. Still, the rates of complications and patient dissatisfaction in our series were unacceptably high. Hence, we stress that interpositional arthroplasty with Tutoplast is not to be recommended as the treatment of choice of arthritis of the CMC-I joint.

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References

1. Alnot JY, Saint Laurent Y (1985) Total trapeziometacarpal arthroplasty. Report on seventeen cases of degenerative arthritis of the trapeziometacarpal joint. Ann Chir Main 4:11–21
2. Braun RM (1982) Total joint replacement at the base of the thumb—preliminary report. J Hand Surg [Am] 7:245–251
3. Burton R, Pellegrini VD (1986) Surgical management of basal joint arthritis of the thumb. Part II. Ligament reconstruction with tendon interposition arthroplasty. J Hand Surg [Am] 11:324–332
4. Carroll RE (1977) Fascial arthroplasty for the carpo-metacarpal joint of the thumb. Orthop Trans 1:15
5. Carroll RE, Hill NA (1973) Arthrodesis of the carpo-metacarpal joint of the thumb. J Bone Joint Surg Br 55:292–294
6. Cooney WP, Linscheid RL, Askew LJ (1987) Total arthroplasty of the thumb trapeziometacarpal joint. Clin Orthop Relat Res 35–45
7. Damen A, van der Lei B, Robinson PH (1996) Carpometacarpal arthritis of the thumb. J Hand Surg [Am] 21:807–812
8. Damen A, van der Lei B, Robinson PH (1997) Bilateral osteoarthritis of the trapeziometacarpal joint treated by bilateral tendon interposition arthroplasty. J Hand Surg [Br] 22:96–99
9. Damen A, van der Lei B, Schepel S, den Dunnen WFA, Robinson PH (2000) Poor results of distal trapezium resection for trapeziometacarpal-I osteoarthritis. Eur J Plast Surg 23:227–231
10. Damen A, Dijkstra T, van der Lei B, den Dunnen WFA, Robinson PH (2001) Long-term results of arthrodesis of the carpometacarpal joint of the thumb. Scand J Plast Reconstr Surg Hand Surg 35:407–413
11. Damen A, Withag KM, van der Lei B, den Dunnen WFA, Robinson PH (2001) Conservative treatment of CMC-I osteoarthritis. Eur J Plast Surg 24:33–37

12. Dell PC, Muniz RB (1987) Interposition arthroplasty of the trapeziometacarpal joint for osteoarthritis. Clin Orthop Relat Res 27–34
13. Eaton RG, Littler JW (1973) Ligament reconstruction for the painful thumb carpometacarpal joint. J Bone Joint Surg Am 55:1655–1666
14. Eaton RG, Lane LB, Littler JW, Keyser JJ (1984) Ligament reconstruction for the painful thumb carpometacarpal joint: a long-term assessment. J Hand Surg [Am] 9:692–699
15. Eaton RG, Akelman E, Eaton BH (1989) Fascial implant arthroplasty for treatment of radioscaphoid degenerative disease. J Hand Surg [Am] 14:766–774
16. Froimson AI (1970) Tendon arthroplasty of the trapeziometacarpal joint. Clin Orthop Relat Res 70:191–199
17. Gervis (1949) Excision of the trapezium for osteoarthritis of the trapezio-metacarpal joint. J Bone Joint Surg Am 31B:537–539 (illust)
18. Gummesson C, Atroshi I, Ekdahl C (2003) The disabilities of the arm, shoulder and hand (DASH) outcome questionnaire: longitudinal construct validity and measuring self-rated health change after surgery. BMC Musculoskelet Disord 4:11
19. Hartigan BJ, Stern PJ, Kiefhaber TR (2001) Thumb carpometacarpal osteoarthritis: arthrodesis compared with ligament reconstruction and tendon interposition. J Bone Joint Surg Am 83-A:1470–1478
20. Hudak PL, Amadio PC, Bombardier C (1996) Development of an upper extremity outcome measure: the DASH (disabilities of the arm, shoulder and hand) [corrected]. The Upper Extremity Collaborative Group (UECG). Am J Ind Med 29:602–608
21. Kaarela O, Raatikainen T (1999) Abductor pollicis longus tendon interposition arthroplasty for carpometacarpal osteoarthritis of the thumb. J Hand Surg [Am] 24:469–475
22. Kleinman WB, Eckenrode JF (1991) Tendon suspension sling arthroplasty for thumb trapeziometacarpal arthritis. J Hand Surg [Am] 16:983–991
23. Kuhns CA, Emerson ET, Meals RA (2003) Hematoma and distraction arthroplasty for thumb basal joint osteoarthritis: a prospective, single-surgeon study including outcomes measures. J Hand Surg [Am] 28:381–389
24. Lanzetta M, Foucher G (1995) A comparison of different surgical techniques in treating degenerative arthrosis of the carpometacarpal joint of the thumb. A retrospective study of 98 cases. J Hand Surg [Br] 20:105–110
25. Lasserre C, Pauzat D, Derennes R (1949) Osteoarthritis of the trapezio-metacarpal joint. J Bone Joint Surg Am 31B:534–536 (illust)
26. Livesey JP, Norris SH, Page RE (1996) First carpometacarpal joint arthritis. A comparison of two arthroplasty techniques. J Hand Surg [Br] 21:182–188
27. Necking LE, Eiken O (1986) ECRL-strip platy for metacarpal base fixation after excision of the trapezium. Scand J Plast Reconstr Surg 20:229–233
28. Nyszkiewicz R, Neumann R (2001) Experiences with Eaton–Littler reconstruction for therapy of ligament instability of the thumb saddle joint. Handchir Mikrochir Plast Chir 33:424–430
29. Patterson R (1933) Carpometacarpal arthroplasty of the thumb. J Bone Joint Surg 15:240–241
30. Schneider LH, Hunter JM (1988) Flexor tendons late reconstruction. In: Green DP (ed) Operative hand surgery. Churchill Livingstone, New York, pp 1969–2044
31. Sigfusson R, Lundborg G (1991) Abductor pollicis longus tendon arthroplasty for treatment of arthrosis in the first carpometacarpal joint. Scand J Plast Reconstr Surg Hand Surg 25:73–77
32. Swanson AB (1972) Disabling arthritis at the base of the thumb: treatment by resection of the trapezium and flexible (silicone) implant arthroplasty. J Bone Joint Surg Am 54:456–471
33. Tomaino MM, Pellegrini VD Jr, Burton RI (1995) Arthroplasty of the basal joint of the thumb. Long-term follow-up after ligament reconstruction with tendon interposition. J Bone Joint Surg Am 77:346–355
34. Van Giffen N, Van Ransbeek H, De Smet L (2002) Stabilization of the pre-arthritic trapeziometacarpal joint using ligament reconstruction. Chir Main 21:277–281
35. Weilby A (1988) Tendon interposition arthroplasty of the first carpo-metacarpal joint. J Hand Surg [Br] 13:421–425
36. Wilson JN (1972) Arthroplasty of the trapezio-metacarpal joint. Plast Reconstr Surg 49:143–148
37. Wilson JN, Bossley CJ (1983) Osteotomy in the treatment of osteoarthritis of the first carpometacarpal joint. J Bone Joint Surg Br 65:179–181
38. Wittemann M, Demir E, Sauerbier M, Germann G (2002) The Epping resection–suspension arthroplasty procedure. A standard procedure in the operative treatment of trapeziometacarpal osteoarthrosis? Handchir Mikrochir Plast Chir 34:49–58